What is claimed is:

5

15

25

- 1. A ZrO₂- Al₂O₃ composite ceramic material comprising:
- a first phase of ZrO_2 grains containing 10 to 12 mol% of CeO_2 as a stabilizer and having an average grain size of $0.1\mu m$ to $1\mu m$, said ZrO_2 grains composed of 90 vol% or more of tetragonal ZrO_2 ;
- a second phase of Al_2O_3 grains having an average grain size of 0.1 to 0.5 μ m, a content of said second phase in the composite ceramic material being within a range of 20 to 60 vol%;
- wherein said Al₂O₃ grains are dispersed within said ZrO₂ grains at a first dispersion ratio of 2% or more, which is defined as a ratio of the number of said Al₂O₃ grains dispersed within said ZrO₂ grains relative to the number of the entire Al₂O₃ grains dispersed in the composite ceramic material, and
 - said ZrO₂ grains are dispersed within said Al₂O₃ grains at a second dispersion ratio of 1% or more, which is defined as a ratio of the number of said ZrO₂ grains dispersed within said Al₂O₃ grains relative to the number of the entire ZrO₂ grains dispersed in the composite ceramic material.
- 20 2. The composite ceramic material as set forth in claim 1, wherein said ZrO₂ grains contains 0.02 to 1 mol% of TiO₂.
 - 3. The composite ceramic material as set forth in claim 1, wherein said Al_2O_3 grains are dispersed within said ZrO_2 grains at the first dispersion ratio of 4% or more.
 - 4. A method of producing a ZrO₂-Al₂O₃ composite ceramic material, said composite

ceramic material comprising:

5

10

20

25

a first phase of ZrO_2 grains containing 10 to 12 mol% of CeO_2 as a stabilizer and having an average grain size of $0.1\mu m$ to $1\mu m$, said ZrO_2 grains composed of 90 vol% or more of tetragonal ZrO_2 ;

a second phase of Al₂O₃ grains having an average grain size of 0.1 to 0.5 μm; wherein said Al₂O₃ grains are dispersed within said ZrO₂ grains at a first dispersion ratio of 2% or more, which is defined as a ratio of the number of said Al₂O₃ grains dispersed within said ZrO₂ grains relative to the number of the entire Al₂O₃ grains dispersed in the composite ceramic material, and

said ZrO₂ grains are dispersed within said Al₂O₃ grains at a second dispersion ratio of 1% or more, which is defined as a ratio of the number of said ZrO₂ grains dispersed within said Al₂O₃ grains relative to the number of the entire ZrO₂ grains dispersed in the composite ceramic material,

wherein the method comprises the steps of:

preparing a first powder for providing said first phase and a second powder for providing said second phase;

mixing said first powder with said second powder such that a content of said second phase in said composite ceramic material is within a range of 20 to 60 vol%;

molding a resultant mixture in a desired shape to obtain a green compact; and sintering said green compact at a sintering temperature in an oxygen-containing atmosphere.

5. The method as set forth in claim 4, wherein said second powder includes a γ -Al₂O₃ powder having a specific surface within the range of 10 to $100m^2/g$ and a substantially spherical shape.

6. The method as set forth in claim 4, wherein said second powder is a mixture of an α - Al₂O₃ powder having an average particle size of 0.3 μ m or less, and a γ -Al₂O₃ powder having a specific surface within the range of 10 to 100m²/g and a substantially spherical shape.

5

10

15

20

25

- 7. The method as set forth in claim 4, wherein said resultant mixture is calcined at a temperature of 800 °C or more and less than said sintering temperature, and then pulverized to obtain a calcined powder, and wherein said green compact of the calcined powder is sintered in the oxygen-containing atmosphere.
- 8. A ZrO₂-Al₂O₃ composite ceramic material comprising:

a first phase of ZrO_2 grains including 90 vol% or more of tetragonal ZrO_2 , which are obtained by use of 10 to 12 mol% of CeO_2 as a stabilizer and 0.02 to 1 mol% of TiO_2 , and having an average grain size of 0.1 μ m to 1 μ m; and a second phase of Al_2O_3 grains having an average grain size of 0.1 to 0.5 μ m;

wherein the composite ceramic material has a mutual nano-composite structure formed under a condition that a content of said second phase in the composite ceramic material is within a range of 20 to 60 vol% such that said Al₂O₃ grains are dispersed within said ZrO₂ grains at a first dispersion ratio of 4% or more, which is defined as a ratio of the number of said Al₂O₃ grains dispersed within said ZrO₂ grains relative to the number of the entire Al₂O₃ grains dispersed in the composite ceramic material, and said ZrO₂ grains are dispersed within said Al₂O₃ grains at a second dispersion ratio of 1% or more, which is defined as a ratio of the number of said ZrO₂ grains dispersed within said Al₂O₃ grains relative to the number of the entire ZrO₂ grains dispersed in the composite ceramic material.